

## Genetics Assessment 40 Points

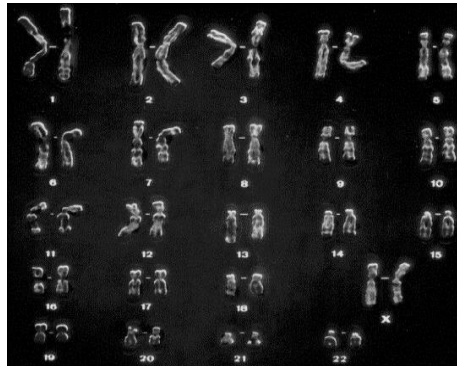
**Multiple Choice** - circle the correct letter (1 pt each)

1. When Gregor Mendel crossed a tall plant with a short plant, what did the  $F_1$  plants inherit?
  - a. An allele for tallness from each parent.
  - b. An allele for tallness from the tall parent and an allele for shortness from the short parent.
  - c. An allele for shortness from each parent.
  - d. An allele from only the tall parent.
2. A tall plant is crossed with a short plant. If the tall  $F_1$  pea plants are allowed to self-pollinate, what will happen?
  - a. The offspring will be of medium height.
  - b. All of the offspring will be short.
  - c. All of the offspring will be tall.
  - d. Some of the offspring will be tall, and some will be short.
3. In the P generation, a tall plant was crossed with a short plant. Short plants reappeared in the  $F_2$  generation because \_\_\_\_\_.
  - a. some of the  $F_2$  plants produced gametes that carried the allele for shortness
  - b. the allele for shortness is dominant
  - c. the allele for shortness and the allele for tallness segregated when the  $F_1$  plants produced gametes
  - d. they inherited an allele for shortness from one parent and an allele for tallness from the other parent
4. How can the principle of probability be used?
  - a. To predict the traits of the offspring produced by genetic crosses.
  - b. To determine the actual outcomes of genetic crosses.
  - c. To predict the traits of the parents used in genetic crosses.
  - d. To decide which organisms are best to use in genetic crosses.
5. When two hybrids are crossed, the probability of producing an offspring with the dominant phenotype is \_\_\_\_\_.
  - a. 50%
  - b. 75%
  - c. 25%
  - d. 100%
6. If you made a Punnett square showing Gregor Mendel's cross between pure-breeding tall plants and pure-breeding short plants, the square would show that the offspring had \_\_\_\_\_.
  - a. the genotype of one of the parents
  - b. a phenotype that was different from that of both parents
  - c. a genotype that was different from that of both parents
  - d. the genotype of both parents

7. How many different allele combinations would be found in the gametes produced whose genotype was RrYY?
- a. 2      b. 4      c. 6      d. 8
8. What are situations in which one allele for a gene is not completely dominant over another allele for that gene called?
- a. Multiple alleles      b. Incomplete dominance      c. Polygenic traits      d. Codominance
9. A cross of a black chicken with a white chicken produces a black and white speckled chicken. This type of inheritance is known as \_\_\_\_\_.
- a. multiple alleles      b. incomplete dominance      c. polygenic traits      d. codominance
10. A man and a woman who are both heterozygous for normal skin pigmentation (Aa) produce an offspring with albinism (aa). Which of Mendel's principles explain(s) why the offspring has albino skin?
- a. Codminance only  
b. Independent assortment only  
c. Dominance and segregation  
d. Segregation only
11. Down syndrome is also referred to as
- a. Monosomy 13      b. Bisomy 22      c. Trisomy 21      d. Quadrasomy 6
12. Gametes have
- a. Homologous chromosomes  
b. Twice the number of chromosomes found in body cells  
c. Two sets of chromosomes  
d. One allele for each gene
13. The best advice for a patient with PKU is to \_\_\_\_\_.
- a. avoid products with aspirin in them  
b. get weekly injections of insulin  
c. attend physical therapy weekly  
d. maintain a low protein diet
14. Patients with diabetes get regular injections of \_\_\_\_\_ because they cannot \_\_\_\_\_ on their own.
- e. insulin; make hemoglobin  
f. insulin; convert food into energy  
g. aspartame; digest proteins  
h. aspartame; consume any sugars

**Circle the best Answer** (1/2 pt each)

15. The diagram below is called a(n) karyotype or allele chart.



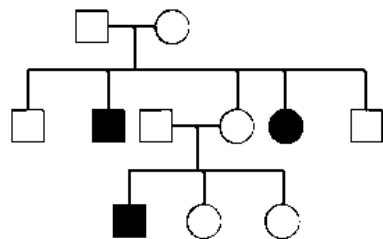
16. Hybrid, is an alternate term for homozygous or heterozygous.

17. Klinefelter's syndrome is when a male has an extra X or Y chromosome.

18. A chromosomal disorder is caused by chromosomes not separating during meiosis, and is called disconnection or nondisjunction.

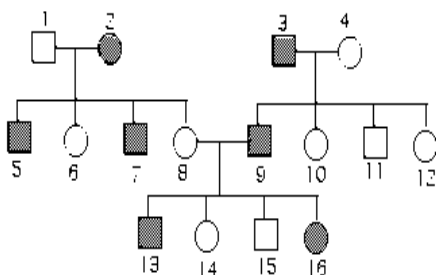
**Which one is it?** (1 pt each)– determine for the following questions if the disease/disorder is (1) **autosomal** or **sex-linked**, and (2) **dominant** or **recessive**

19. The pedigree chart below – **autosomal recessive**



Black square = affected male, Black circle = affected female,  
white square = normal male, white circle = normal female

20. The pedigree chart below – **autosomal dominant**



Black square = affected male, Black circle = affected female,  
white square = normal male, white circle = normal female

21. Tay-Sachs Disease – **autosomal recessive**

### Short Answer

22. Draw a Punnett Square for the following trait. A purple hippopotamus is heterozygous for his body color. He makes babies with a grey hippo. (Choose a letter with a clear difference between lowercase and capital!) (2 pts)

Purple = H		H	h
Grey = h	h	Hh	hh
HH and hh	h	Hh	hh

23. What % of their offspring will be grey? (1 pt)

50%

24. The gene map of a rabbit's chromosome 6 shows the relative locations of the fluffy, black eye, and brown body genes to be 3.4, 7.0, and 27.6, respectively. Between which two genes does crossing over occur most frequently? Explain your reasoning. (3 pts)

- 1- Fluffy and brown body
- 2- Furthest away from each other
- 3- Makes separation more likely and crossing over more probable

25. Could a mutation in a person's somatic cell be passed onto the individual's offspring? Explain why or why not. (3 pts)

- 1- Yes
- 2- All cells carry the same DNA which codes for everything
- 3- Gametes are the mode of transportation for this DNA

26. Why are sex-linked traits so much more common in males? (2 pts)

- 1- Only have 1 X
- 2- No masking can occur
- 3- If there is a mutation on the X chromosome it will automatically show

27. Finish the Punnett Square. Mother: yyHh, Father: YyHh (4 pts)

	YH	Yh	yH	? yh
yH	YyHH	? YyHh	yyHH	? yyHh
yH	? YyHH	YyHh	yyHH	? yyHh
yh	YyHh	Yyhh	yyHh	? yyhh
yh	YyHh	Yyhh	? yyHh	? yyhh

28. What is the chance of a baby purebred, either dominant or recessive, for both traits? (1 pt)

25%

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## Essay

29. There are notable characteristics that are similar among parents and their children. Very often a mother or father with black hair and green eyes will have a child with those same features. How is it that these two traits are so often passed down together, while another trait such as feet size is not the same case? (5 pts)

- 1- Closeness/relation on chromosome
- 2- Meiosis
- 3- Segregation as it relates to whole chromosomes
- 4- Gene linkage
- 5- Crossing over unlikely between two close knit genes
- 6- No or little relation to feet size gene to these other two